

Plant Taxonomy in Relation to Biodiversity*

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Taxonomy is an integrated and, perhaps, intuitive science of identifying, naming and classifying plants (and all other organisms). This may be considered as the oldest of sciences in the world, as the primitive man had to distinguish the plants that he can eat safely, from those which are poisonous and inedible. Thus, from the very inception itself, taxonomy was not a pure science but an applied science.

Modern taxonomy, which started with the exploration of tropical plant wealth during the colonial era, was also not a product of mere scientific curiosity but the result of commercial and such other practical considerations. *Hortus Malabaricus*, the monumental 12-volume treatise on the plants of Malabar, published in the 17th century, which is the first major book on the tropical flora of the world, is an example of this. The usefulness of new plants to their national economy was of greater consideration to most of the taxonomists, than of a pure scientific exercise. Every plant was studied for its use as food, medicine, timber, etc. Horticultural value was also a concern, since many plants such as orchids were highly expensive commodities, to discover which expensive and laborious expeditions were organised.

The results of floristic explorations and taxonomic studies are usually compiled in the form of Floras, which are "front-line publications" (Heywood, 1988), that bring together and evaluate, often for the first time, the nomenclature, distribution, ecology and utility of various species naturally occurring in a country or region. The names of the plants themselves are not mere identification tags, since a good classification provides volumes of other relevant data about the affinities and inter-relationships of the taxa. This is because good taxonomy is a product of synthesis of data obtained from all sources such as cytology, anatomy, embryology, phytochemistry, physiology, palynology, biometry, etc. Now that we know that species are not static entities, variations within the species and the causes for such variations have also become a major concern of taxonomy.

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As an interpreter of the existing organic diversity, and with the task of "detection of evolution at work" (Huxley, 1940), Modern Taxonomy, takes into account information on the origin and evolution of variations, isolation mechanisms, speciation, breeding behaviour of populations and such other functional details also. Thus, while most of the other branches of biology are, in general, narrowly intensive in nature, taxonomy is perhaps the only discipline exploring and interpreting the harmonious diversity of organisms and the station and placement of each of them in the methodical natural progression of organic evolution, in a synthetic perspective.

Taxonomists are not the only users and beneficiaries of Floras and systematic treatments of the plants of a region. Floras are used by many others like biochemists, physiologists, plant breeders, medical professionals, pharmaceutical industries, agricultural industries, environmental agencies, landscape designers, gardeners, field naturalists, etc. They are, thus of real service to the material development of the natural plant wealth. For an effective and meaningful utilization of its natural plant resources, it is essential that a country has its own comprehensive and up-to-date Flora.

Floras of tropical countries were written by botanists of temperate countries, particularly of Europe and North America. Many were written in the colonial era. Although India boasts of its scientific manpower in quality as well as in quantity, we are still depended upon the *Flora of British India* written by J. D. Hooker during 1872-1897 and the regional Floras, such as the *Flora of the Presidency of Madras*, written by Gamble (1916-1931). The reports of occurrence of many species since their publication, make the usefulness of these out-dated Floras limited. However, for want of any other more comprehensive books, we are obliged to use them even today. Insufficient data on the existing plants and flora is resulting in misleading conclusions and is creating much confusion in every sphere of our activity.

The compilation of the Flora of a large and floristically rich country like ours, is not an easy job that can be completed overnight. This can be done only with the active co-operation and sustained participation of a large number of taxonomists located in different parts of the country. According to a recent statistical analysis (Wilson, 1988), it is found that while the developed countries have one (competent) taxonomist for every 10 species, developing countries like India have one taxonomist for every 1000 species only, i. e., the developed countries have 100 times more taxonomists than we have.

Tropical forests are the cradles of evolution and centres of biodiversity. Since such forests lie in underdeveloped countries, no thorough studies have been conducted there, where many new species could be found. In Europe and North America floristic inventorisations have been completed long back. For

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example, in the Netherlands the total number of species of flowering plants is about 1,600 and hardly any new species have been reported from there in the past 20 years. In India, the total number of species according to the Flora of British India is about 17,000 and in the past 20 years a few hundred new species have been reported additionally.

A thorough investigation of our flora has become an urgent necessity not only because of the economic and ecological importance of biodiversity, but also because of the accelerated genetic erosion as a consequence of the destruction of the forests and other habitats like mangroves and undisturbed streams and rivers. Essentially, systematics is the study of biodiversity in a conservation-conscious context (Heywood, 1988), as is evident from its extreme relevance in the Biological Patent Laws and Intellectual Property Rights. It is in this context that the importance and necessity of what is called as the Classical Taxonomy becomes clear (Manilal, 1992).

While agreeing that cytological, biochemical, biometric and such other studies are very useful and important, we should accept the fact that they by themselves are unable to solve the two most important albeit basic problems, i.e.,

- (1) What is the name of a given plant; and
- (2) What all are the plants that are existing in our country.

Classical taxonomy and taxonomists are needed for obtaining this information, which is basic for any academic research on the species by others as well as for proper economic exploitation of our plant wealth. To those who, belittle the importance of taxonomy, we would like to pose the question: who other than taxonomists, would be able to give the answers to these two fundamental problems.

Taxonomists themselves, may well be considered as an endangered species. In India, taxonomy is not extinct yet because of a few dedicated individuals who did not choose to run away from this discipline, despite the occasional snipes taken at them by their more fashionable colleagues, or the lure of better rewards elsewhere. However, it is high time that for the sake of self-reliance and economic independence of the country and to protect our biological wealth in the changing context of global laws, the authorities wake up to this responsibility with due seriousness. Tomorrow may be too late.

What is to be done for this? Some suggestions are: Ensure that the country has enough man-power of trained taxonomists. Young taxonomists should be given all encouragements to continue their research and improve the quality of their work. More students and younger botanists should be attracted to this branch by improving the quality of taxonomy teaching in universities and

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colleges, and by ensuring job opportunities for them. It must be ensured that there is at least one taxonomist with field experience in governmental and quasi-governmental agencies involved in policy making and research funding in plant sciences, including forestry, environment and biodiversity conservation. Gathering full and comprehensive data, on the full spectrum of the diversity of the flora of our country is one of the very urgent tasks facing us. This should be done on the basis of field exploration and not by compiling the existing isolated literature, which may give a false picture of the actual situation. Biodiversity and its conservation are inseparably linked with and depended on taxonomic information.

Would the work of taxonomists be over, once a Flora is written? The answer is "no". Because, unlike most other disciplines of science, taxonomy is a dynamic science. The processes of evolution are continuing phenomena and are going on, perhaps at a faster rate, even today. As long as biological evolution is taking place, throwing up newer and newer varieties, species and genera, taxonomy would continue to be relevant. Apart from biological evolution, other natural processes such as migration, adaptation, extinction, etc., are also taking place everywhere in the world to keep taxonomists engaged and busy.

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